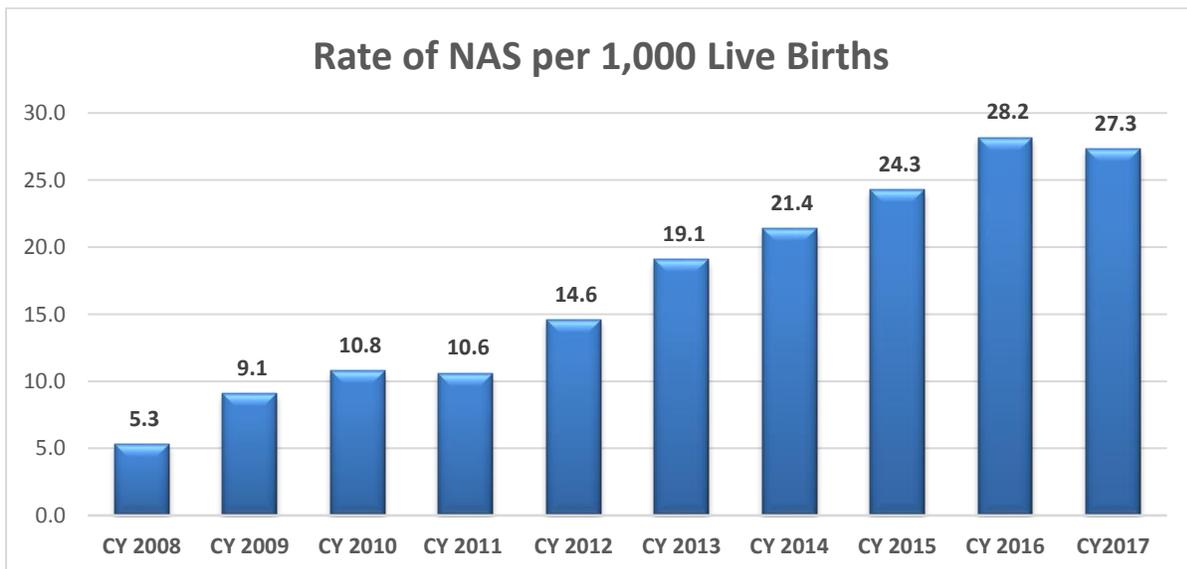


Neonatal Abstinence Syndrome (NAS) among TennCare enrollees - 2017 data

Cases of neonatal abstinence syndrome (NAS) were identified based on the presence of ICD10 codes P96.1 and P96.2 occurring during the first year of life¹. Each calendar year cohort was restricted to children born in the specified year. TennCare eligibility status was determined using TennCare’s Interchange system. Cases were identified from infants that were eligible at time of birth or enrolled in TennCare during their first year of life. Live births, used as the denominator, were determined based on a linkage of vital statistics records and TennCare Interchange records.

Figure 1: Incidence of Neonatal Abstinence Syndrome among TennCare Enrollees



As Figure 1 illustrates, there was an increase in the incidence rate of NAS per 1,000 live births among TennCare recipients from CY 2008 to CY 2016, but a slight decrease in the rate of NAS births from CY 2016 to CY 2017. The number of TennCare births did not change dramatically from CY 2008 to CY 2017. There was a 3.5% increase in births from CY 2016 to CY 2017 but only 0.4% increase in NAS cases for the same period.

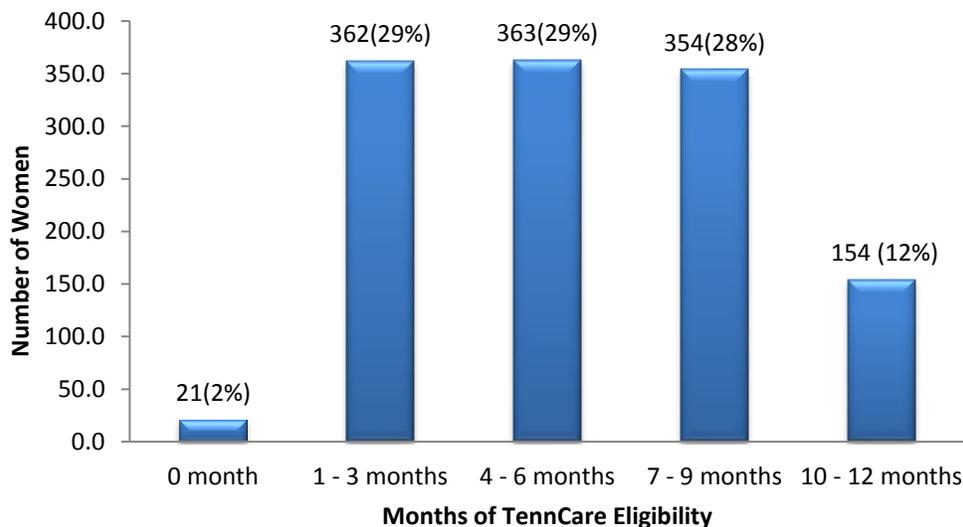
¹ (def) Drug withdrawal syndrome in a newborn, excluding fetal alcohol syndrome.

Table 1: 2017 NAS Mother’s TennCare Status at Time of Delivery

Calendar Year	TennCare Newborns Treated for NAS During Year	Mothers on TennCare at Time of TennCare NAS Birth	Percent of TennCare NAS Infants Born to TennCare Mothers	Mothers NOT on TennCare at Time of TennCare NAS Birth	Percent of TennCare NAS Infants NOT Born to TennCare Mothers
2008	264	229	87%	35	13%
2009	444	335	75%	109	25%
2010	512	424	83%	88	17%
2011	528	483	91%	45	9%
2012	736	613	83%	123	17%
2013	943	823	87%	120	13%
2014	1,101	1,017	92%	84	8%
2015	1,197	1,098	92%	99	8%
2016	1,357	1,261	93%	96	7%
2017	1,363	1,254	92%	109	8%

Table 1 presents information regarding the TennCare status of mothers of TennCare NAS infants at the time of birth. In 2017, 92% of TennCare NAS infants were born to mothers who were on TennCare at the time of delivery; the remaining 8% were born to mothers not on TennCare at the time of delivery.

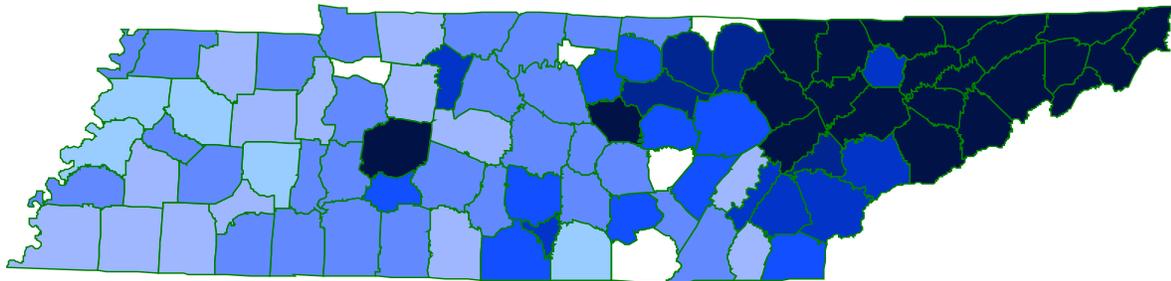
Figure 2: Length of Prior Year’s Eligibility for 2017 TennCare NAS Mothers



For each woman with a TennCare child diagnosed with NAS in CY 2017, the length of eligibility for the mother within a 12 month period prior to the child’s birth was determined (Figure 2). There were a total

of 21 women with no TennCare eligibility in the year prior to the child’s birth. Approximately 60% of women with NAS children had TennCare eligibility for 6 months or less prior to the child’s delivery.

Map 1: Incidence of NAS among TennCare Recipients - 2017



Rate of NAS per	 0 - 4.9	 5 - 9.9	 10 - 19.9	 20 - 29.9
1,000 Births:	 30 - 39.9	 40 - 49.9	 50 +	

SOURCE: Division OF TENNCARE 29MAR19

In order to visualize the relative incidence of NAS by county, rates were plotted on a map of the state of Tennessee (Map 1). For the purpose of calculating county level rates, the county of residence for the infant was based on the address of the mother at the time of delivery. Live births were used as the denominator. The degree of regional variation is significant, with the majority of NAS cases in east Tennessee. In 2017, Hancock County had the highest incidence of NAS births with 157.9 NAS births per 1,000 live infants. The county with the highest total number of NAS births was Knox County with 160 NAS infants in CY 2017. NAS births follow a similar geographic pattern as emergency department visits for prescription drug related overdoses, in which rates are considerably higher in east and middle Tennessee.

Figure 3: Demographic Characteristics of 2017 NAS mothers

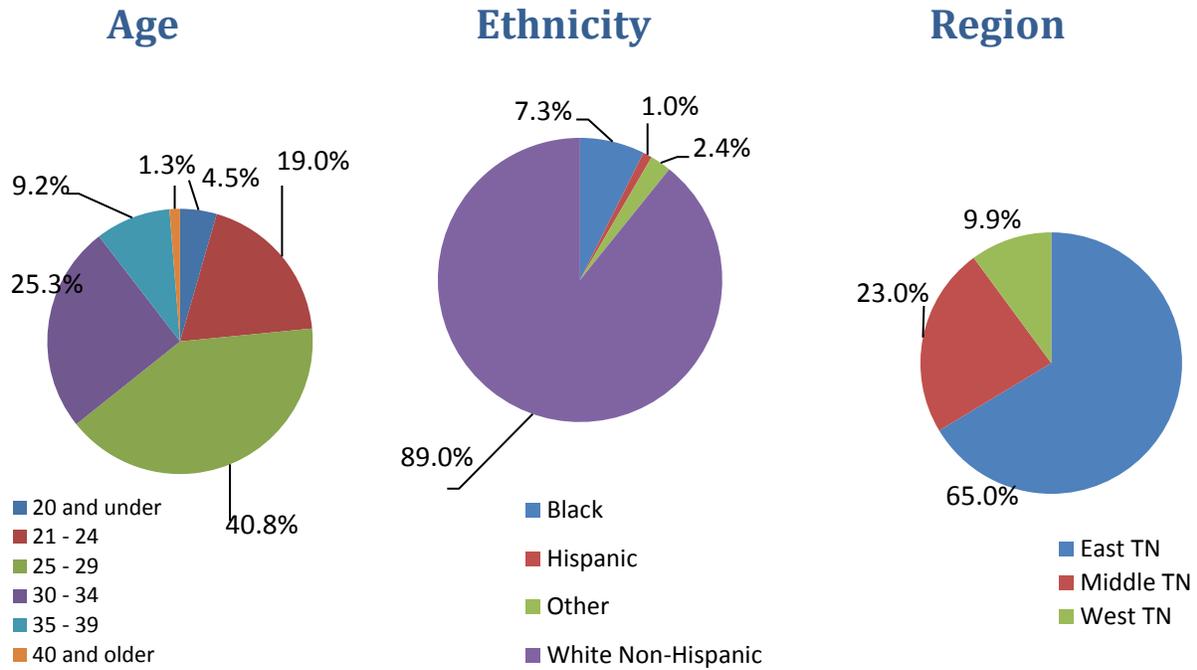


Figure 3 displays basic demographic characteristics of mothers who had some period of TennCare eligibility in the year prior to the birth of a NAS infant in CY 2017. Just over 85% of the NAS mothers are between the ages of 21 and 34, a slight decrease from the previous year (86%). And about 65% of the women have a county of residence in east Tennessee. 89% of all mothers with a NAS infant treated by TennCare were White Non-Hispanic.

Table 2: Impact of NAS on infant health care expenditures² - 2017 data

Metric	All TennCare paid live births	All TennCare normal birth weight births	All TennCare live low birth weight births	NAS babies
Number of births	47,985	42,741	5,244	1,366
Total costs for infants in first year of life	\$410,992,907	\$217,697,512	\$193,295,395	\$59,040,339
Average cost per child	\$8,565	\$5,093	\$36,860	\$43,221
Average length of stay (days)	3.8	2.3	16.0	21.7

To determine the financial impact of NAS relative to all births, TennCare’s Interchange system was used to quantify expenditures for live born infants in the first year of life (Table 2). In CY 2017 the average cost of care for a NAS infant in the first year of life is more than 8.0 times higher than the average cost of care for normal birth weight infants and approximately 1.2 times higher than the average cost of care for low birth weight infants.

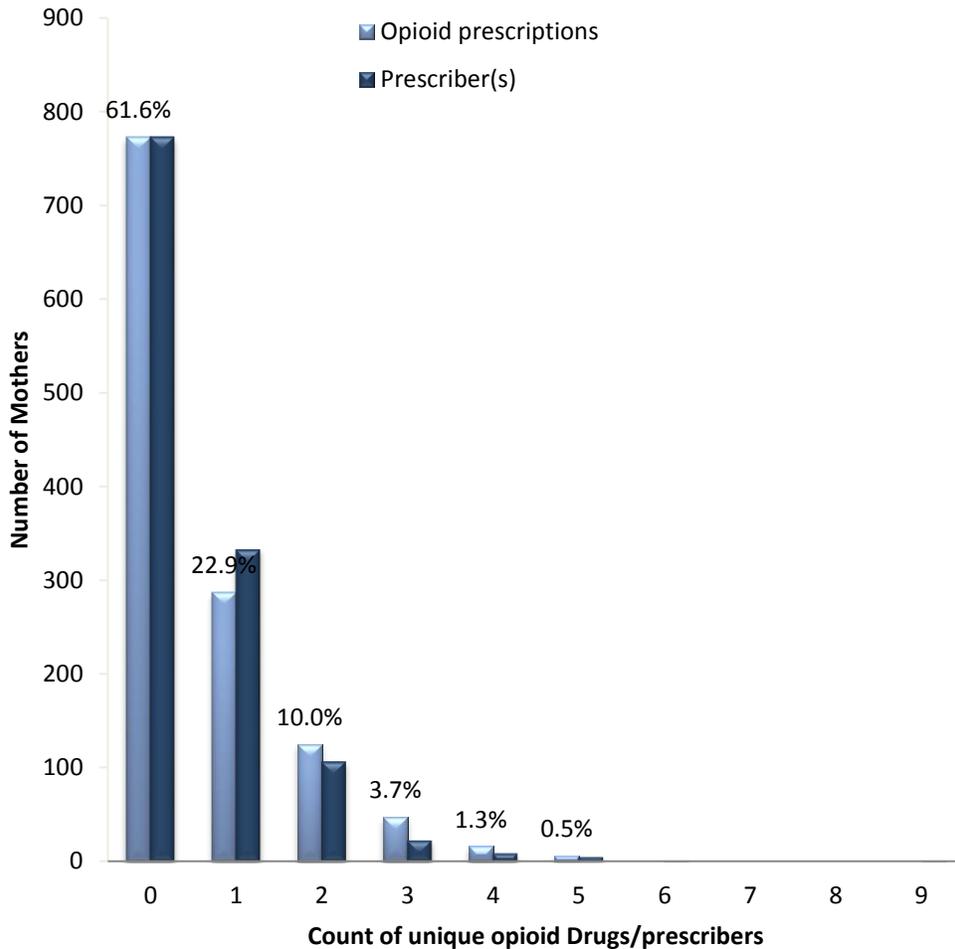
Table 3: Percentage of infants in DCS custody within one year of birth - 2017 data

Metric	All Infants	NAS infants
Total Number of Infants	51,881	1,363
Number Infants in DCS Custody	949	243
Percent of Infants in DCS	1.8%	17.8%

Using TennCare eligibility records it was determined that 243 of the 1,363 infants diagnosed with NAS in CY 2017 (17.8%) were placed in DCS custody within one year of their birth. Among all TennCare infants born in CY 2017, 1.8% were placed in DCS within one year of birth (Table 3). Infants born with NAS are about 9.7 times more likely to be in DCS custody during their first year of life as compared with other TennCare infants.

² Includes all expenditures paid through the first year of life. Totals are subject to change based on updated data.

Figure 4: Number of Opioid prescriptions and Prescribers Paid by TennCare for 2017 NAS Mothers



All opioid claims up to one year prior to birth for any woman with a NAS child were evaluated (Figure 4)³. It illustrates the numbers of NAS mothers with TennCare-paid prescriptions for varying numbers of opioid drugs as well as the number of prescribers. Overall, a total of 2,966 TennCare-paid prescriptions for opioid were issued for women with NAS babies. This represents nearly a 28% decrease in the total number of TennCare-paid opioid prescriptions (2,966) compared to previous year (4,102). The overall percentage of mother's who did not receive

³ Any pharmacy claim with an NDC correlation to the following HIC3 codes was considered an opioid: H3A, H3H, H3J, H3M, H3N, H3R, H3T, H3U, H3W or H3X.

opioid prescriptions paid by TennCare is 61.6% (773/1,254) for CY2017 versus 47.7% (602/1,261) for CY2016; It is significant in improvement for opioid treatment and opioid utilization. Among NAS mothers with at least one opioid prescription paid by TennCare, each mother had on average 1.6 unique prescribers of opioid in the year period. Approximately 30% of women with NAS babies who received opioid prescriptions appeared to be receiving treatment for opioid dependence/addiction; however, it is important to note that TennCare does not cover methadone clinic services. Therefore, if these women were receiving methadone maintenance therapy, claims for those services would not be included in this count. Additionally, this does not account for services provided in an institutional setting, such as an inpatient hospital, or other forms of addiction treatment where a separate pharmacy claim does not exist.

Table 4: Narcotic analgesic and contraceptive use among all TennCare women - 2017 data

Demographics	TennCare Women	Women Prescribed Opioid (>30 days supplied)	Opioid Users Rate per 1,000	Women Prescribed Contraceptives and Opioid	% of Women on Opioid and Contraceptives	Women Prescribed Opioid (without Contraceptives)	% of Women on Opioid Not on Contraceptives
All Women 15 - 44	372,400	22,434	66	3,355	14%	21,079	86%
15 - 20	94,516	252	3	91	36%	161	64%
21 - 24	47,790	1,009	21	299	30%	710	70%
25 - 29	69,240	3,452	50	830	24%	2,622	76%
30 - 34	63,386	5,453	86	889	26%	2,564	74%
35 - 39	56,912	7,237	127	767	11%	6,470	89%
40 - 44	40,556	7,031	173	479	7%	6,552	93%

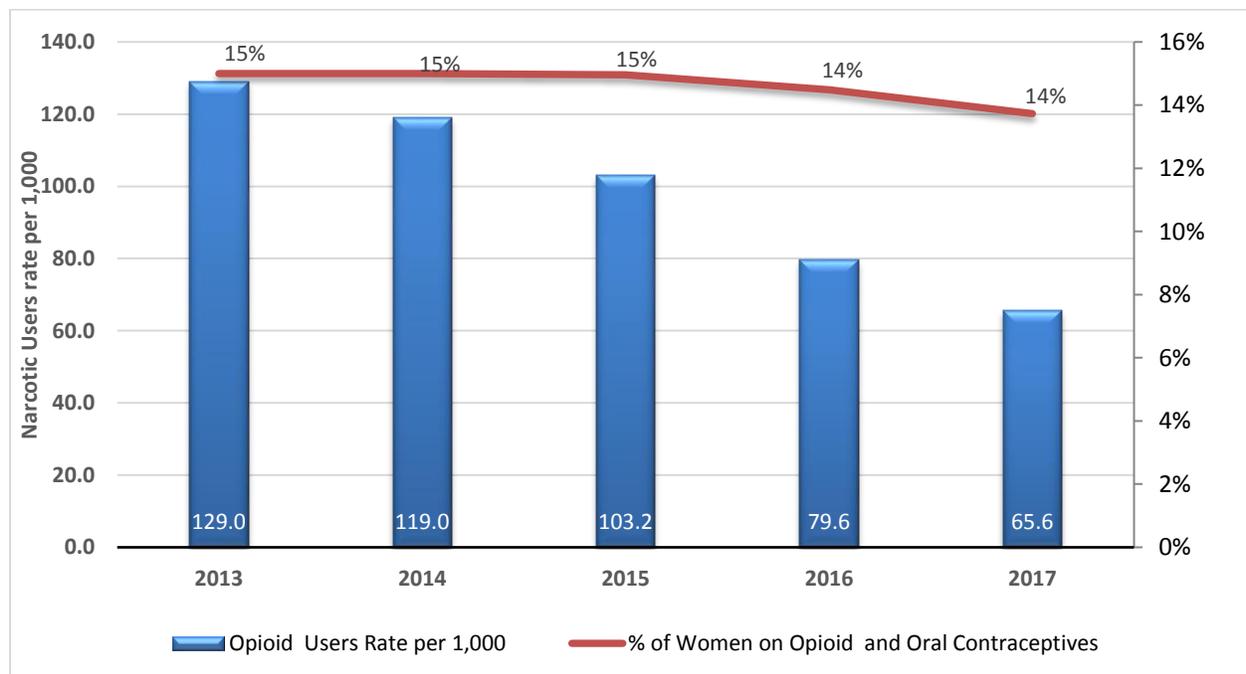
Note: Voluntary Reversible Long Acting Contraceptives (VRLAC) was not included in the table above; future reports anticipated to include members receiving forms of long – acting contraceptives in the numerator for this metric. This metric also does not account for permanent forms of contraception such as tubal ligation or hysterectomy.

The rate of women using prescribed opioid and oral contraceptive medications was determined in CY 2017 (Table 4). The analysis was limited only to women of child-bearing age (15 – 44). The drug histories of TennCare women of child-bearing age were evaluated for the presence of opioid and oral

contraceptive products⁶. Women were excluded from the analysis if they had opioid prescriptions totaling less than 30 days in CY 2017.

As Table 4 indicates, approximately 14% of women of child-bearing age who are prescribed opioid are also prescribed some form of oral contraceptive, consistent with previous years. The overall rate of prescription opioid utilization among women aged 15-44 is 65.6 opioid users per 1,000 eligible women, a 17.6% decrease compared to previous year (see Figure 5 below). The data above indicates that approximately 21,079 women of child-bearing age who are using opioid for more than 30 days a year are not on an oral contraceptive paid for by TennCare. Future analysis will attempt to incorporate additional forms of contraception (e.g. voluntary reversible long-acting contraceptives, birth control injections, or TennCare members who have had sterilization procedures) to better analyze contraceptive usage amongst TennCare narcotic users. Among women ages 15-44 using narcotics for more than 30 days a year, women ages 15-24 are the most likely to have contraceptive and opioid prescriptions (over 30%) when compared with other age ranges.

Figure 5: Narcotics and contraceptives trends for TennCare women – 2017 data



⁶ Any pharmacy claim with an NDC correlating to any HIC3 codes of G8A, G8B or G8C was considered a contraceptive.



Based on the 5-year data regarding the utilization of opioid and oral contraceptives among TennCare women aged 15 to 44 years old, the rate of opioid users per 1,000 women continuously decreased during 2013-2017. Figure 5 shows a 49.1% decrease in the opioid users' rate in 2017 (65.6 per 1,000 women) compared to the rate in 2013 (129.0 per 1,000 women), as well as a slight increase in the percentage of women prescribed and both opioid and oral contraceptives.